

The Scientific Revolution & Enlightenment

Homework: Review Ch. 18
for a quest tomorrow

The Scientific Revolution

- Scientists sought to explain how the universe functioned
- Their findings often conflicted with traditional teachings of Aristotle and the Roman Catholic Church

Important individuals of the Scientific Revolution

Copernicus

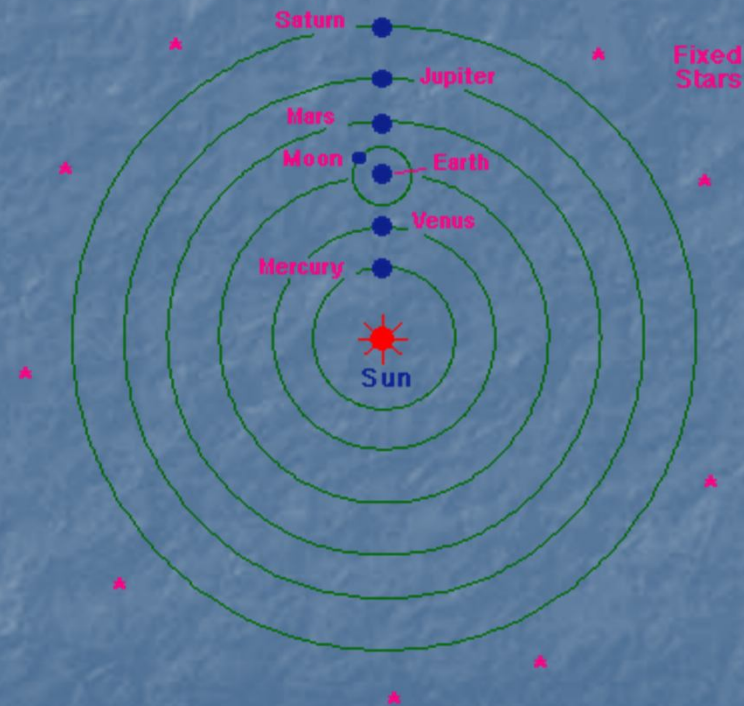
1473-1553



- Highly educated Polish astronomer
- Studied medicine, law, mathematics, and astronomy

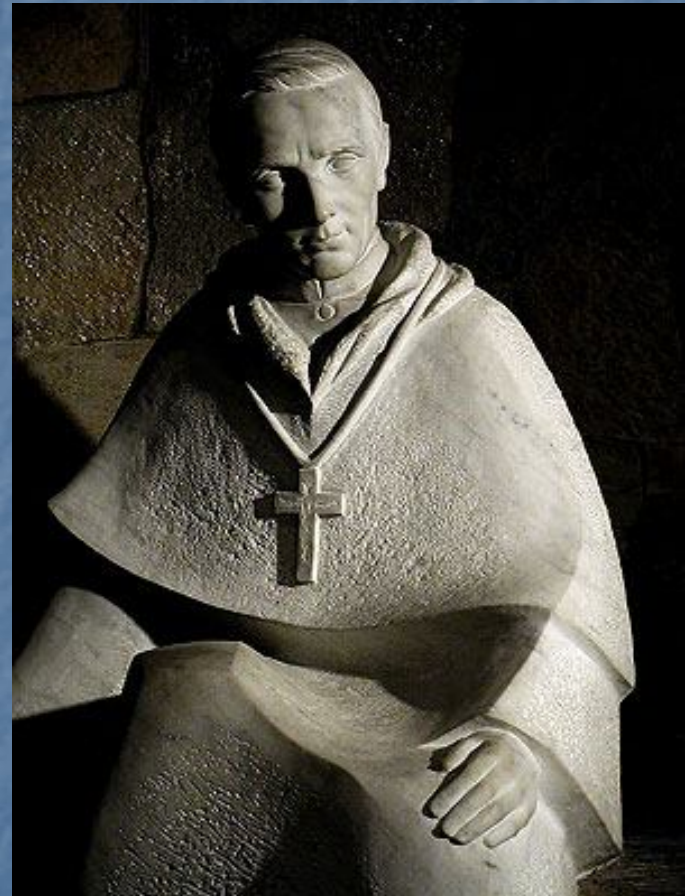
Copernicus

- Wrote and published *On the Revolutions of Heavenly Bodies* just prior to his death in order to avoid criticism of the Church
- Proposed the **heliocentric theory** which proported that the Sun is the center of the universe and the Earth rotates around it



Copernican theory

- His heliocentric theory caused a stir in society as the Church immediately criticized the concept
- God created the Earth and put mankind on it. This planet, the Church said, was the center of God's attention and subsequently the universe.



Tycho Brahe

1546-1601

- Danish astronomer
- Believed the key to understanding the universe was careful observation and analysis of data
- His greatest contribution was the data he collected that would be used by future astronomers



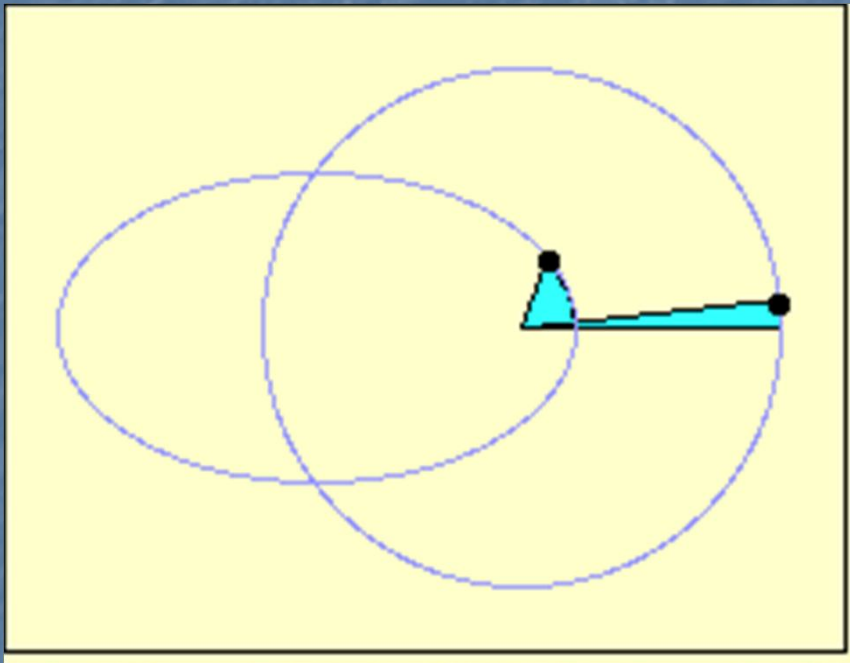
Johannes Kepler

1571-1630



- Using Brahe's data, Kepler was the first to correctly explain planetary motion.

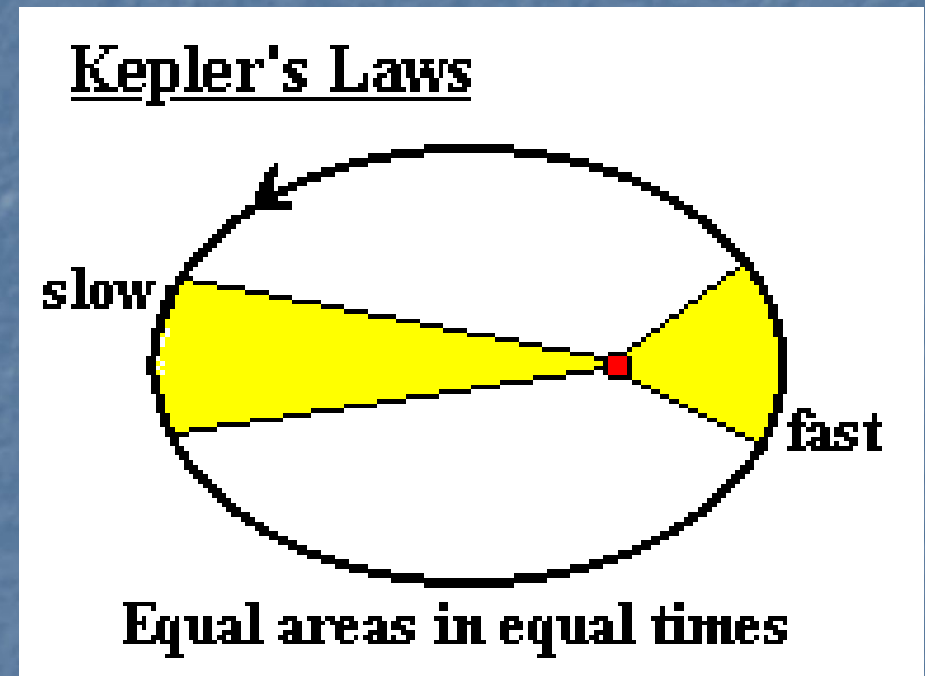
Kepler



- He concluded that planets move in an elliptical orbit rather than a circular orbit around the sun.
- His skills as a mathematician allowed him to prove his theory mathematically.

Kepler

- Also did important work with optics
- A devout Christian, he believe man – made in the image of God - had the ability to understand the workings of universe

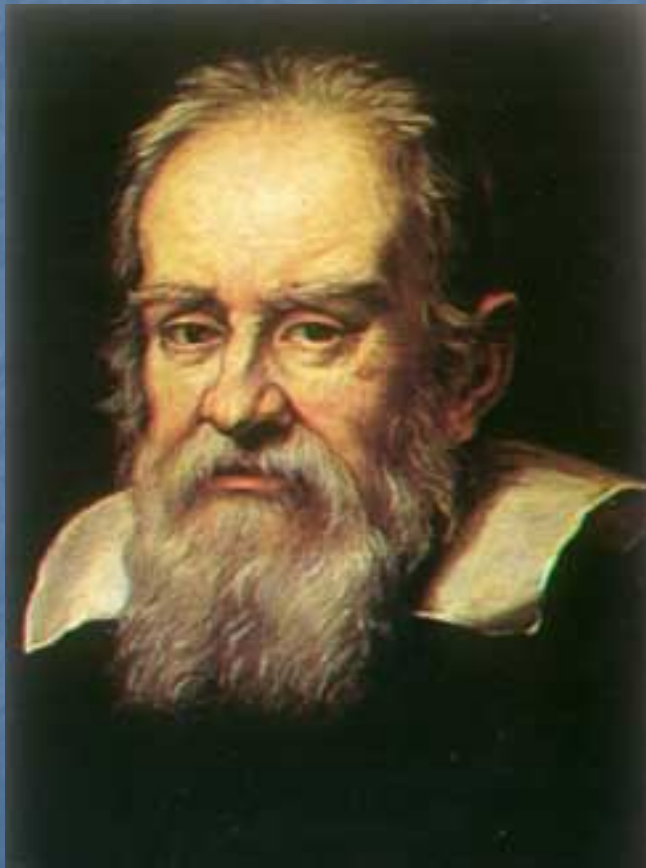




Johannes Kepler

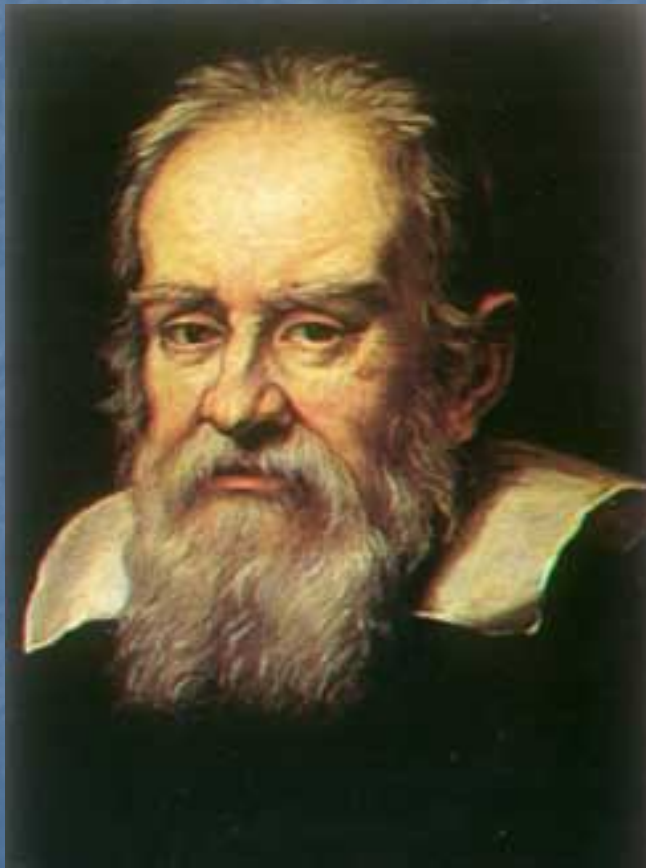
Galileo Galilei

1564-1642



- An Italian scientist, he challenged many theories of Aristotle and was subsequently called before the Church Inquisition to answer for his actions

Galileo



- A professor of mathematics, he proved mathematically what Copernicus has theorized: the Earth rotates around the Sun

Galileo

- Wrote *Dialogue Concerning the Two Chief Systems of World* , in which he explained his support of the Copernican theory
- Perfected the telescope and was able to see the surface of moon was not smooth like glass as Aristotle had thought



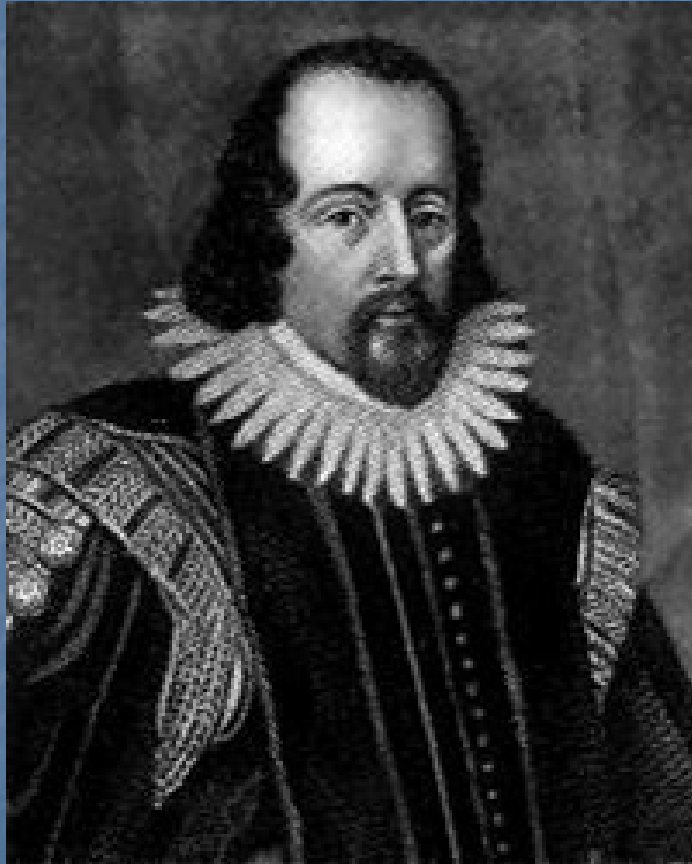
Galileo



- Brought before the Inquisition, he recanted his beliefs in order to avoid punishment from the church court.

Francis Bacon

1561-1626



- The English politician and writer developed the experimental method known as *empiricism* – which required one to observe, gather information, and then draw conclusions

René Descartes

1596-1650

If you would be a real
seeker after truth,
it is necessary that at
least once in your life
you doubt, as far as
possible, all things.

—Descartes



René Descartes

1596-1650

- Born in France, he is famous as a philosopher, physicist, and mathematician
- Considered the father of analytical geometry



René Descartes

1596-1650

- Sometimes considered the founder of modern philosophy, he introduced the now-famous phrase:
"cogito ergo sum," or in English
"I think, therefore I am."

Isaac Newton

1643-1727



- A mathematician, physicist, and one of the foremost scientific intellects of all times, he is regarded as the founder of modern physical science.

Newton

- Wrote *Mathematical Principals of Natural Philosophy* and describe the universe as a giant clock whose parts work together mathematically
- Very religious, he saw God as the great watchmaker

PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA.

Autore *J. S. NEWTON, Trin. Coll. Cantab. Soc. Matheseos
Professore Lucasiano, & Societatis Regalis Sodali.*

IMPRIMATUR.
S. PEPYS, Reg. Soc. PRÆSES.
Julii 5. 1686.

LONDINI,
*Jussu Societatis Regiæ ac Typis Josephi Streater. Prostant Vena-
les apud Sam. Smith ad insignia Principis Walliæ in Cœmiterio
D. Pauli, aliosq; nonnullos Bibliopolas. Anno MDCLXXXVII.*

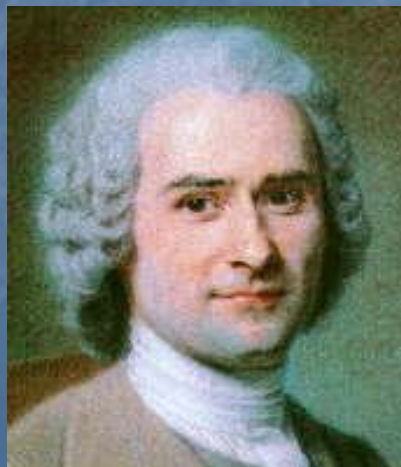
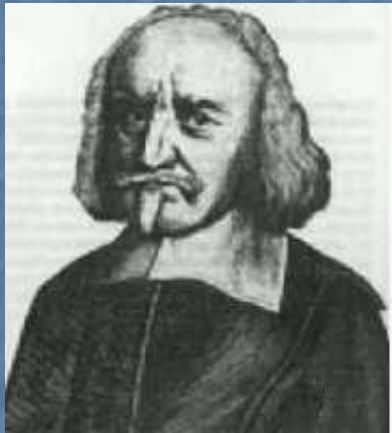
- Described the laws of motion and laws of gravity in mathematical terms



"Nothing yet. ...How about you, Newton?"

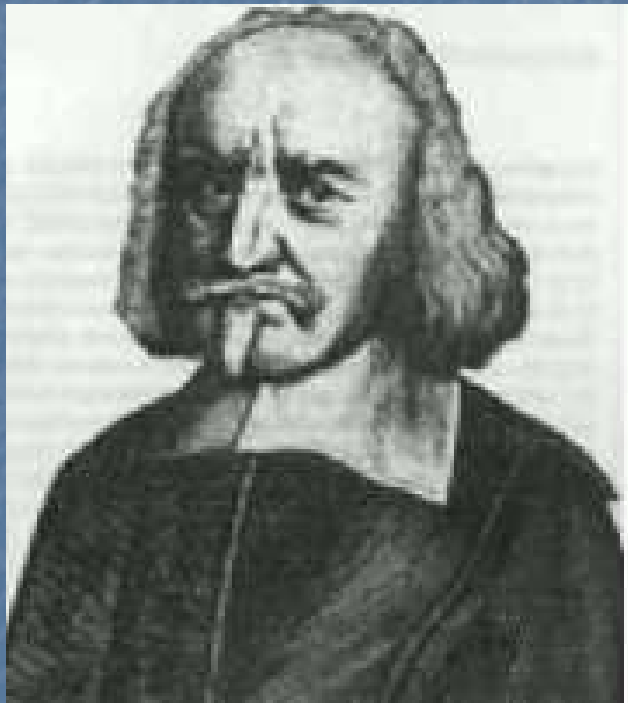
- Contrary to popular belief, Newton probably did not develop his theory of the laws of gravity by getting hit on the head by an apple.

Enlightenment Thinkers



Thomas Hobbes

1588-1679



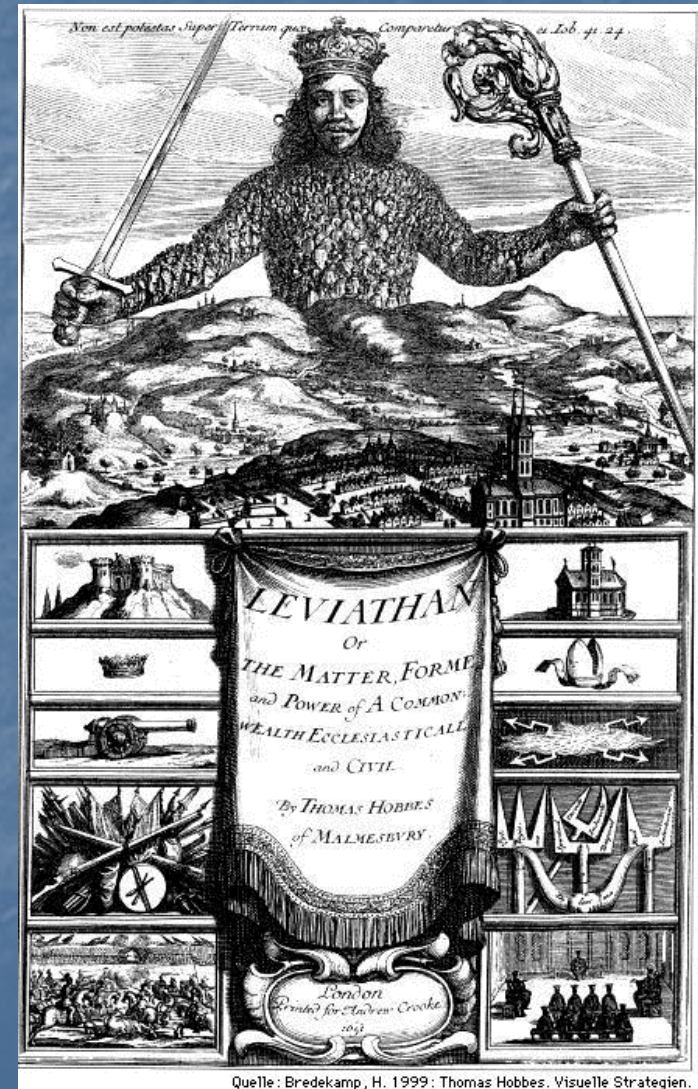
- With a pessimistic view of human nature, Englishman Thomas Hobbes supported a government led by an absolute monarch

Hobbes

He wrote *Leviathan*, in which he outlined his political philosophy.

Notice how the picture resembles England's King Charles I (before he lost his head)

Hobbes wrote this after the Puritan Revolution and felt Charles I should have been left to rule as an absolute monarch



Quelle: Bredekamp, H. 1999: Thomas Hobbes. Visuelle Strategien.

John Locke

1632-1704



- Unlike Hobbes, Locke had a positive view of human nature and felt people had the ability to choose their leaders effectively.

John Locke

- An Oxford scholar, Locke was an intelligent and gifted writer.
- His *Essay on Human Understanding* attempted to determine the extent of human potential.
- His *Two Treatises on Government* was written after the Glorious Revolution and presented his argument supporting the overthrow of unjust government.

John Locke

- Unlike Hobbes, Locke believed government held power with the consent of the people and could be overthrown if it failed to protect the *natural rights* of the people – life, liberty, and property.
- In the words of an infamous Vestal teacher:
Hobbes – you're locked; Locke – you're not.

Voltaire

1694-1778

- A French philosophe who supported religious toleration, free speech, free press, and a government led by an *enlightened monarch*.
- Born at the time when Louis XIV ruled France

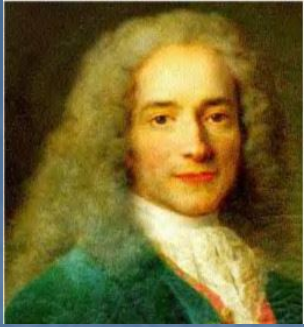


Voltaire

**Those who can make you believe absurdities can make
you commit atrocities.**

—Voltaire

What did he mean by this?

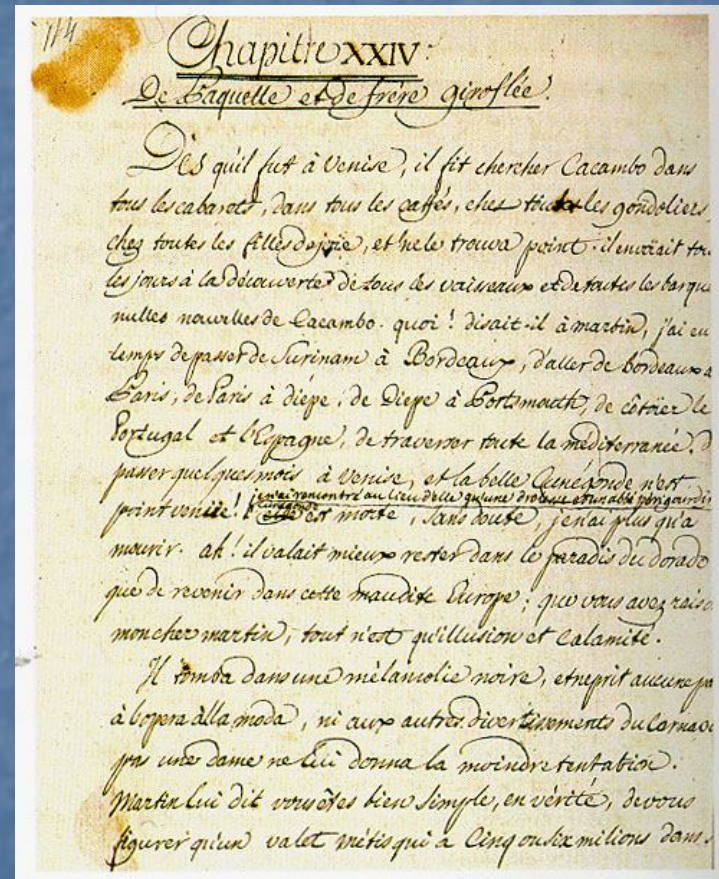


Voltaire

- After spending 11 months in a French prison for one of his satirical essays about French government, Voltaire lived in exile in England for a few years and was impressed with England's customs and institutions.
- A friend of Frederick II of Prussia and Catherine the Great of Russia, people he considered good examples of *enlightened monarchs* – leaders whose actions were in the best interest of their people.

Voltaire

- Wrote *Candide*, the story of a young hero who goes through a long series of misfortunes & disastrous adventures.



Baron Montesquieu

1689-1755

- French philosophe who supported a government divided into three branches – legislative, judicial, executive – in order to maintain a system of checks and balances to prevent one branch from becoming too powerful.
- His ideas would have a profound impact of the development of the new American government.



Mary Wollstonecraft

1759-1797



- Wrote several essays and books on the need for women to be properly educated, a concept way ahead of its time.
- *A Vindication of the Rights of Women* – she attacked those who would keep women from education and blamed women themselves for being too accepting of their domestic role.

Cesare Beccaria

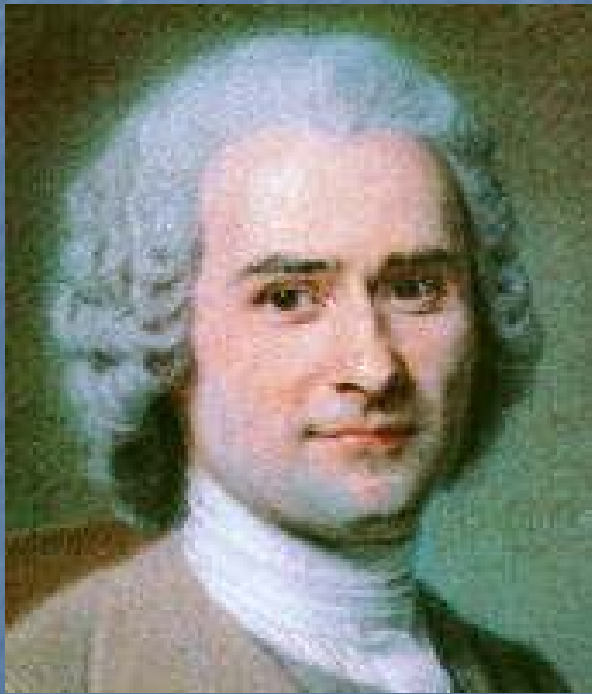
1738-1794



- He wrote *On Crimes and Punishments*, in which he professed that the purpose of criminal punishment should be to create a better society, not revenge.
- Punishments should deter others from committing the crime.

Jean Jacques Rousseau

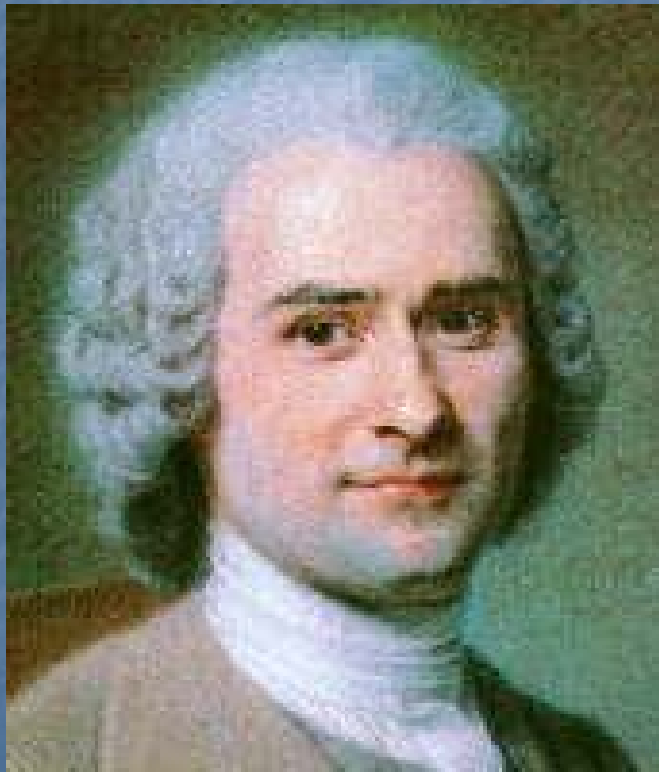
1712-1778



- He believed that people are basically good, but corrupted by society.
- Government is a necessary evil that people must have in order to maintain social order.

Jean Jacques Rousseau

1712-1778



- Believed that people enter into an agreement – a *social contract* – and form a government that is ruled by the *general will* of the people.
- Wrote *Emile*, in which he detailed his views of education for children.

Enlightened Monarchs

- Believed that political change could best come from above; from the ruler.
- Were encouraged by the philosophes to make good laws to promote human happiness
- They justified their authority on the grounds of *usefulness*, not *divine right*

Frederick the Great

r. 1740-1789

- Corresponded with Voltaire
- Wrote *Anti-Machiavelli* where he said a ruler is not the absolute master but the first servant of the state
- Welcomed Catholics, persecuted Jews but less than others



Frederick the Great

r. 1740-1789

- Promoted education through elementary schooling for all & high schools for future government officials
- Wrote poetry, learned French from Voltaire, played the flute



Maria Theresa of Austria

r. 1740-1780

- Strengthened the central govt. by taxing the nobility & church
- Expelled the Jesuits
- Took the first steps to abolish serfdom in Europe (completed in Austria by her son, Joseph)



Joseph II

r. 1765-1790

- Equal punishment for equal crimes
- Equal taxes for all classes
- Abolished serfdom
- Granted equal civil rights to Jews
- Epitome of an Enlightened Monarch
 - Most of his reforms were overturned upon his death by his brother, Leopold II



Catherine the Great

r. 1762-1796



- Corresponded with Voltaire, Diderot, & others
- Paid lip service to western ideas but brought little reform to Russia after a peasant rebellion in 1773
- Expanded Russia's boundaries
- Joined with Austria and Prussia to partition Poland

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